I U C L I D

Data Set

Existing Chemical	:	ID: 26040-51-7
CAS No.	:	26040-51-7
Generic name	:	Phthalic Acid Tetrabromo Ester

Producer related part

Company	:	Health & Environmental Horizons, Ltd.
Creation date	:	13.10.2003

Substance related part

Company	:	Health & Environmental Horizons, Ltd.
Creation date	:	13.10.2003
Status	:	
Memo	:	
Printing date	:	04.12.2003
Revision date	:	
Date of last update	:	27.11.2003
Number of pages	:	35
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2.1 MELTING POINT

Value	:	= 229.2 °C
Sublimation	:	
Method	:	other: mean or weighted MP
Year	:	
GLP	:	
Test substance	:	

24.11.2003 (13)

2.2 BOILING POINT

Value	:	= 539.8 °C at
Decomposition	:	
Method	:	other: adapted Stein & Brown method
Year	:	
GLP	:	
Test substance	:	

24.11.2003 (13)

2.3 DENSITY

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Decomposition	:	
Method	:	other (calculated): modified Grain method
Year	:	
GLP	:	
Test substance	:	
Result	:	1.71E-011 mmHg @ 25 degrees C

24.11.2003 (12)

2.5 PARTITION COEFFICIENT

Partition coefficient	:	
Log pow	:	ca. 11.95 at °C
pH value	:	
Remark	:	logKow (estimated)

24.11.2003 (9)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	Water
Value	:	at °C

pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	other: not readily water soluble
Stable	:	

13.10.2003

Solubility in	:	Water
Value	:	at °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	

Result : 1.983E-009 mg/L @ 25 degrees C
24.11.2003 (10) (27)

2.6.2 SURFACE TENSION

2.7 FLASH POINT

2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

Method	:	other:
Year	:	
GLP	:	
Test substance	:	

Result : Kb Half-Life at pH 7 : 29.219 days
Kb Half-Life at pH 8 : 2.922 days
Total Kb for pH > 8 at 25 degrees C : 2.74E+000 L/mole-sec
24.11.2003 (2)

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

Memo	: Bond Method: 2.98E-007 atm-m3/mole	HENRYWIN v3.10
27.11.2003		
Memo	: Group Method: 3.08E-007 atm-m3/mole	HENRYWIN v3.10
27.11.2003		
Memo	: Henrys LC : 8.012E-003 atm-m3/mole values	VP/WSol estimate using EPI
27.11.2003		
Memo	: Henrys Law Constant (25 degrees C)	
27.11.2003		

3.1.1 PHOTODEGRADATION

Type	:	other: no data available
Light source	:	
Light spectrum	:	nm
Relative intensity	:	based on intensity of sunlight

24.11.2003

3.1.2 STABILITY IN WATER

Type	:	abiotic
t1/2 pH4	:	at °C
t1/2 pH7	:	at °C
t1/2 pH9	:	at °C
Result	:	The half-life at 25 degrees C and pH 7 is 29.219 days

24.11.2003 (8)

3.1.3 STABILITY IN SOIL

Deg. product	:	
Method	:	other (calculated):
Year	:	
GLP	:	
Test substance	:	
Result	:	Koc : 1.26E+006 Log Koc : 6.101

24.11.2003 (26)

3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type	:	other: Atmospheric Oxidation
Media	:	
Air	:	% (Fugacity Model Level I)
Water	:	% (Fugacity Model Level I)
Soil	:	% (Fugacity Model Level I)
Biota	:	% (Fugacity Model Level II/III)
Soil	:	% (Fugacity Model Level II/III)
Method	:	
Year	:	
Result	:	Hydroxyl Radicals Reaction:

Overall OH Rate Constant = 21.8176E-12 cm3/molecule-sec

Half-Life = 0.490 days (12 hr day; 1.5E6 OH/cm3)

Half-Life = 5.883 hrs

Ozone Reaction: No estimate

24.11.2003 (3)

Type : fugacity model level III
Media :
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method :
Year :

Result : Air
0.123 9 mass amount%
11.8 half-life (hour)
1000 emissions (kg/hr)
Persistence Time
2.74E+003 hour
Sediment
65.4 mass amount (%)
5.76E+003 half-life (hours)
0 emissions
Soil
32.2 mass amount (%)
1.44E+003 half-life (hour)
1000 emissions
Water
2.27 mass amount (%)
1.44E+003 half-life (hour)
1000 emissions (kg/hr)

24.11.2003

3.3.2 DISTRIBUTION

Media : water - air
Method : other (calculation)
Year :

Result : Henry LC: 3.08E-007 atm-m3/mole
24.11.2003 (1)

Media : water - air
Method : other (calculation)
Year :

Result : Half-Life from Model River: 5054 hours (210.6 days)
24.11.2003

Media : water - air
Method : other (calculation)
Year :

Result : Half-Life from Model Lake: 5.536E+004 hours (2307 days)
24.11.2003

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type	:	aerobic
Inoculum	:	activated sludge, domestic
Contact time	:	28 day(s)
Degradation	:	< 4 (±) % after 28 day(s)
Result	:	other: not readily biodegradable
Deg. product	:	
Method	:	other: OECD 301B and OECD 301D
Year	:	1989
GLP	:	yes
Test substance	:	other TS: Pyronil 45, purity 95%

Method :

RECOGNIZED METHOD: Study was conducted in accordance with a recognized scientific procedure for biodegradation and is based on OECD 301D. Closed bottle test and OECD 301B, Biotic degradation Modified Sturm test.

EXPOSURE PERIOD: 28 days

INOCULUM: The inoculum was secondary effluent obtained from a trickling-filter plant at a sewage treatment works that treats predominantly domestic waste. It was maintained under aerobic conditions in the lab until required. It was then vacuum-filtered through filter paper and the filtrate used as the inoculum.

TEST PROCEDURE: The chemical oxygen demand (COD) was determined by oxidation with acid-dichromate mixture. The test material has a low aqueous solubility and therefore, 0.46-0.78 mg of test material were directly applied to glass cover slips and added to COD vials, together with 2 ml of water. Concentrations ranged from 230-390 mg/l.

Bacterial inhibition test:

Seven groups of BOD (Biological Oxygen Demand) bottles were prepared:

1. mineral salts medium
2. inoculum
3. inoculum + sodium benzoate (2 mg/L)
4. inoculum + test material (2 mg/L)
5. inoculum + test material (10 mg/L)
6. inoculum + test material (2 mg/L) + sodium benzoate (2 mg/L)
7. inoculum + test material (10 mg/L) + sodium benzoate (2 mg/L)

The test concentrations were prepared by direct addition of test material, on glass cover slips, to BOD bottles to yield nominal concentrations of 2 and 10 mg/L. The concentration of dissolved oxygen (DO), pH and temperature were measured at the start of the test, after 5 days of incubation at 20 degrees C, and after 10 days of incubation.

Modified Sturm test:
Four vessels (3.5 L), containing mineral salts (MSMS), bacterial sludge, test material or sodium benzoate, were prepared as follows:

1. inoculated MSMS
2. inoculated MSMS + sodium benzoate (20 mg/L)
3. inoculated MSMS + test material (10 mg/L)

4. inoculated MSMS + test material (20 mg/L)

Weights of the test material were 35 and 70 mg, added directly to the solutions. The closed bottle test was performed according to the EEC/OECD test guidelines (No. 301 D).

Prior to the test, CO2 was removed by flushing with air that had been passed through Carbosorb ASI, 10N sodium hydroxide, and 0.025N barium hydroxide for 24 hours. In the closed bottle test, the test compound was added to an aqueous solution of mineral salts and exposed to relatively low numbers of microorganisms under aerobic conditions for a period of 28 days.

Samples were taken throughout the study for pH, temperature and dissolved organic carbon (DOC).
The following endpoints were determined:

ThOD (iheroretical oxygen demand) of the test material
TCO2 (theroretical carbon dioxide) generated by the test material
COD (chemical oxygen demand) of each sample
BOD (biological oxygen demand) in the bacterial inhibition test
CO2 production by control, reference and test mixtures.

Result : RESULTS: Determination of biodegradation: The biodegradation is calculated as the ratio of the biochemical oxygen demand (BOD) to the theoretical oxygen demand (ThOD). The ThOD of the test substance is 1.34 mg O2/mg test substance. Oxygen consumption was only 0.06 and 0.05 mgO2/mg, or 4% of its ThOD, at 2 and 10 mg/L after 10 days.

These values indicate that the test material is not readily degradable. The degradation of sodium benzoate was not effected by the presence of the test material, demonstrating that it was not inhibitory to the bacterial inoculum.

The COD was 0.92 mgO2/mg, or 69% of its ThOD, demonstrating that the material was not completely oxidized.

CO2 production after 28 days was 1.1 and 2.3 mg for 10 and 20 mg/L test samples. This is only 2% of the TCO2. These levels of TCO2 after 28 days further demonstrate that the test material was not readily degradable. The DOC also illustrates that the test material was poorly soluble.

Temperatures of the test vessels ranged from 20.0 to 20.5 degrees C, and the pH was 7.02-7.27 (at the start) and 6.42-6.99 (at the end).

The reference substance was 91% degraded after 28 days together with the cumulative CO2 production in the control (20.1 mg) confirmed the viability of the inoculum, and validate the test results.

Test substance : TEST MATERIAL: Pale yellow clear liquid; Pyronil 45; Code 6605-57; halogenated phthalate ester; RC9927; FR-45B; purity 95%; specific gravity = 1.545 @ 25 degrees C/4 degrees C; empirical formula: C24H34O4Br4; CAS No. 26040-51-7.

Attached document : BD-1 Graph.doc

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized scientific procedure for biodegradation and is based on OECD 301B and OECD 301D [Degradation-biotic degradation: Closed bottle test]. The study was conducted in accordance with GLP standards. The study provides sufficient information to support the conclusion that the test material is not readily biodegradable.

24.11.2003 (25)

Contact time :

Degradation : (±) % after
Result : other: calculated

Result : Probability of Rapid Biodegradation

Linear Model : 0.5352
Non-Linear Model : 0.1319

27.11.2003 (5)

Contact time :
Degradation : (±) % after
Result : other: calculated

Result : Expert Survey Biodegradation Results:

Ultimate Survey Model: 1.9718 (months)
Primary Survey Model: 3.2110 (weeks)

27.11.2003

Contact time :
Degradation : (±) % after
Result : other: calculated

Result : Readily Biodegradable Probability

Linear Model : 0.3604
Non-Linear Model : 0.0581

27.11.2003 (11)

3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

Elimination :
Method : other:
Year :
GLP :
Test substance :

Result : Log BCF = 0.500 (BCF = 3.162)
Log Kow used : 11.95 (estimated)

24.11.2003 (4)

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	other: calculated
Species	:	
Exposure period	:	
Unit	:	
Result	:	ECOSAR Class: Neutral Organic SAR (baseline toxicity) Organism: Fish Distribution: 14 day End Point: LC50 Predicted mg/L (ppm): 2.04E-006 Note: the chemical may not be soluble enough to measure this predicted effect. Fish and daphnid acute toxicity log Kow cutoff is 5.0; Green Algae EC50 toxicity log Kow cutoff is 6.4; Chronic toxicity log Kow cutoff is 8.0; MW cutoff is 1000.

27.11.2003 (6)

Type	:	other: calculated
Species	:	
Exposure period	:	
Unit	:	
Result	:	ECOSAR Class: Esters Organism: Fish Distribution: 96 hour End Point: LC50 Predicted mg/L (ppm): 0.000508 Note: the chemical may not be soluble enough to measure this predicted effect. Fish and daphnid acute toxicity log Kow cutoff is 5.0; Green Algae EC50 toxicity log Kow cutoff is 6.4; Chronic toxicity log Kow cutoff is 8.0; MW cutoff is 1000.

27.11.2003 (6)

Type	:	other: calculated
Species	:	
Exposure period	:	
Unit	:	
Result	:	ECOSAR Class: Esters Organism: Fish Distribution: End Point: ChV Predicted mg/L (ppm): 2.37E-007 Note: the chemical may not be soluble enough to measure this predicted effect. Fish and daphnid acute toxicity log Kow cutoff is 5.0; Green Algae EC50 toxicity log Kow cutoff is 6.4; Chronic toxicity log Kow cutoff is 8.0; MW cutoff is 1000.

27.11.2003 (6)

Type	:	static
Species	:	Salmo gairdneri (Fish, estuary, fresh water)
Exposure period	:	96 hour(s)
Unit	:	
Method	:	OECD Guide-line 203 "Fish, Acute Toxicity Test"
Year	:	1989

GLP : yes
Test substance : other TS: Pyronil 45

Method : RECOGNIZED METHOD: The test was carried out in accordance with OECD Test Guideline 203.

SPECIES: Salmo gairdneri, Rainbow Trout, obtained as fry and raised in the laboratory until they averaged 1.45 grams (mean wet weight).

WATER QUALITY and CONDITIONS DURING REARING: Hardness was 188-228 mg/l of CaCO3; temperature was 13-14.3 degrees C; pH was 7.3-7.8; dissolved oxygen concentration was 69-96%.

EXPOSURE PERIOD: 96 hours

ANALYTICAL MEASUREMENTS: Oxygen concentration, temperature and pH were measured during the test; as well as total hardness of the dilution water.

TEST DETAILS:
Preliminary toxicity and dispersion tests: Since the test material is not readily soluble, several preliminary tests were performed to determine the best methods for solubilizing the test material. Nominal concentrations were prepared. Ultrasound, vigorous shaking and acetone did not adequately produce homogenous dispersions based upon qualitative assessments (e.g. visual). Dimethyl formamide, triethylene glycol, methanol and ethanol were also tested. Based upon appearance (and not quantitative measurement) ethanol was selected to provide the best dispersion (e.g. least amount of undispersed test material in solution).

The test was performed as a static test, using 10 fish per each of the following concentrations: 0, 62.5, 125, 250, 500 and 1000 mg/L. Control fish were exposed to water alone or water plus ethanol (0.1 mg/L). Fish were observed for 45 minutes and again at 2 hours and 4 hours. Thereafter, fish were observed at 24, 48, 72 and 96 hours.

Result : RESULTS:
Preliminary toxicity test: There were no mortalities. Analysis of samples performed during the preliminary toxicity test revealed that the test material had exceeded the nominal exposure levels, illustrating the test preparations were not homogenous. The temperature, pH, dissolved oxygen and hardness of the water were all measured.

Definitive toxicity test: There were no mortalities. In the definitive test, the analytical measurements of test preparations further illustrate the unreliability of the test concentrations. Test preparations were not homogenous. Undissolved material was observed in all dose vessels and in some cases was reported as "large globules". Once again water quality measurements were performed.

The LC50 (96 h) was not calculated because there were no deaths at the highest concentration of 1000 mg/L. However, the actual test concentration could not be verified by analytical measurements because the test substance was not dissolved and remained visible during the test. These test results cannot be interpreted.

Test substance : TEST MATERIAL: Pale yellow clear liquid; Pyronil 45; Code 6605-57; halogenated phthalate ester; RC9927; FR-45B; purity 95%; specific gravity = 1.545 @ 25 degrees C/4 degrees C. Not readily water soluble. CAS No. 26040-51-7.

Attached document : AF-1 Table.doc
Reliability : (3) invalid
DATA QUALITY: Study was conducted in accordance with a recognized scientific method for determining acute toxicity to fish. There was no

mortality. The oxygen concentration was >90%. The insolubility of the test substance limits the quality and reliability of the study results.

The study is confounded by the insolubility of the test material resulting in poor analytical test concentrations. Based upon results obtained in the Daphnia study it is clear that the test material cannot be kept in solution at concentrations greater than 1 mg/L. The test results from the 96 hour fish toxicity study are not valid.

24.11.2003 (24)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	static
Species	:	Daphnia magna (Crustacea)
Exposure period	:	48 hour(s)
Unit	:	
Method	:	OECD Guide-line 202
Year	:	1989
GLP	:	yes
Test substance	:	

Method : RECOGNIZED METHOD: The test was carried out in accordance with OECD Test Guideline 202.

EXPOSURE PERIOD: 48 hours

SPECIES: Daphnia magna; obtained from National Institute for Applied Chemical Research in France. Cultures were maintained in tap water having a hardness of 200-250 mg/L CaCO3, temperature of 20 degrees C. Cultures were fed 5 times a week with unicellular green alga (Chlorella vulgaris) and yeast. Gravid Daphnia were removed from culture, isolated and the juveniles produced were removed each day. Juveniles used in the test were 6-24 hours old.

EXPOSURE PERIOD: 48 hours

STATISTICAL METHODS: The EC50 was calculated using a binomial, moving average and/or probit analysis, using the number of Daphnia exposed and the number immobile and/or floating, at each nominal or measured concentration.

TEST DETAILS: Preliminary tests: Several preliminary tests were conducted to determine the appropriate test conditions for solubilizing the test material, since it is poorly water soluble. In the first preliminary test, test concentrations were prepared ranging from 1 to 1000 mg/L. Water temperature was 19 degrees C and hardness was 202-218 mg/l as CaCO3. Each nominal concentration was prepared in water and shaken for 2 hours, then ultrasound for 15 minutes. At 1 and 10 m/l the test solutions were clear. At 100 and 1000 mg/l test material was visible as oily droplets on the surface. All daphnia were immobile after 48 hours, except at 1000 mg/l where all Daphnia were floating on the surface. Analysis of concentrations demonstrated that at 1 mg/L (nominal) actual concentrations were 0.84 - 0.87 m/l at the start and 0.72-0.75 mg/l at 48 hours. At 1000 mg/l (nominal) actual concentrations were 159-256 mg/l at the start and 141-203 mg/l at 48 hours.

In a second preliminary test, test material was prepared in acetone (10 mg/ml) and diluted in aqueous stock to provide nominal concentrations of 0.01, 0.1 and 1 mg/l. Water quality was the same as the first preliminary test and pH was 7.7-8.2. All Daphnia were immobile and floating on the

surface after 48 hours at 1 mg/l; while at 0.01 and 0.1 mg/l they were mobile. All test solutions were clear. Two groups of 5 daphnia each were exposed at each concentration. Analytical measurements were not performed.

Definitive test: The deionized water used was produced from tap water in a water purification system. The test was carried out in a temperature controlled room with a light regime of 16 hours of ambient light per day, provided by fluorescent tubes. The test was performed with Daphnia magna (water fleas) from a continuous culture maintained at the testing facility. The animals used in the test were less than 24 hours old at the beginning of the test and were obtained from parent animals having an age of 2-4 weeks.

The test was performed as a static test lasting 48 hours. There were four vessels at each exposure concentration and two control groups. Each contained 20 daphnia. The daphnia were exposed to the chosen concentrations of the test substance and immobility and sub-lethal effects were recorded at approximately 24 and 48 hours. The daphnia were considered immobile when they were not able to swim for 15 seconds after gentle agitation of the test vessel. In addition to immobility, sub-lethal effects such as floating at the surface were recorded.
The daphnia were randomly placed in the test solutions and the test vessels were positioned in a random manner. The test solutions were not aerated. The animals were not fed during the test. The nominal concentrations selected were 0.063, 0.125, 0.25, 0.5 and 1 mg/l.

ANALYTICAL MONITORING: Chemical analyses of the test concentrations revealed they were 77-88% of nominal at the start and 64-124% at 48 hours.

Result : RESULTS: The 48 hour EC50, based upon nominal concentrations, was 0.38 mg/l for immobile Daphnia, and 0.34 mg/l for combined immobile plus floating Daphnia. The 48 hour EC50, based upon actual concentrations, was 0.30 mg/l for immobile Daphnia, and 0.27 mg/l for combined floating plus immobile. The lowest concentration produced 5% immobile and 20% floating; whereas the highest concentration produced 95% immobile.

Test substance : TEST MATERIAL: Pale yellow clear liquid; Pyronil 45; Code 6605-57; halogenated phthalate ester; FR-45B; purity 95%; specific gravity = 1.545 @ 25 degrees C/4 degrees C. Not readily water soluble. CAS No. 26040-51-7.

Attached document : AINV-1 Analyt.Monitoring.doc
AINV-1 Observ. Times.doc
AINV-1 Results.doc

Reliability : (2) valid with restrictions
DATA QUALITY: This study was conducted in accordance with a recognized scientific procedure for determining acute toxicity to aquatic invertebrates. Special techniques had to be incorporated in order to insure that the test material was soluble; i.e. solubilize in acetone, ultra-sound, dilute concentrations.

15.10.2003 (23)

Type : other: calculated
Species :
Exposure period :
Unit :

Result : ECOSAR Class: Esters
Organism: Daphid
Distribution: 48 hours
End Point: LC50
Predicted mg/L (ppm): 4.95E-007

Note: the chemical may not be soluble enough to measure this predicted effect. Fish and daphnid acute toxicity log Kow cutoff is 5.0; Green Algae EC50 toxicity log Kow cutoff is 6.4; Chronic toxicity log Kow cutoff is 8.0; MW cutoff is 1000.

27.11.2003 (7)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species	:	
Endpoint	:	other: calculated
Exposure period	:	
Unit	:	
Result	:	ECOSAR Class: Esters Organism: Green Algae Distribution: 96 hours End Point: EC50 Predicted mg/L (ppm): 5.83E-005 Note: the chemical may not be soluble enough to measure this predicted effect. Fish and daphnid acute toxicity log Kow cutoff is 5.0; Green Algae EC50 toxicity log Kow cutoff is 6.4; Chronic toxicity log Kow cutoff is 8.0; MW cutoff is 1000.

27.11.2003 (7)

Species	:	
Endpoint	:	other: calculated
Exposure period	:	
Unit	:	
Result	:	ECOSAR Class: Esters Organism: Green Algae Distribution: End Point: ChV Predicted mg/L (ppm): 5.55E-005 Note: the chemical may not be soluble enough to measure this predicted effect. Fish and daphnid acute toxicity log Kow cutoff is 5.0; Green Algae EC50 toxicity log Kow cutoff is 6.4; Chronic toxicity log Kow cutoff is 8.0; MW cutoff is 1000.

27.11.2003 (7)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

Type	:	other: Acute oral
Value	:	
Species	:	rat
Strain	:	other: Charles River CD
Sex	:	male/female
Number of animals	:	10
Vehicle	:	other: corn oil
Doses	:	5000 mg/kg
Method	:	OECD Guide-line 401 "Acute Oral Toxicity"
Year	:	1987
GLP	:	yes
Test substance	:	

Method : RECOGNIZED METHOD, i.e. OECD: OECD Guideline 401 and EPA Toxic Substances Control Act Test Guidelines (1985)

SPECIES/SEX: Charles River CD Rats; males and female; young adults (5 weeks old); males weighing 117 grams and females weighing 116 grams.

DOSE LEVEL(S) and NUMBER OF DOSES: 1 dose of 5000 mg/kg suspended in maize (corn) oil; a 50% v/v solution.

NUMBER OF ANIMALS/DOSE: 5 Male/5 Female

STUDY METHOD: Groups of 5 male and 5 female Charles River CD rats were administered a single oral dose of 5000 mg/kg of test material in a constant volume (10 ml/kg). Rats were grouped housed. Food and water available ad libitum, except for overnight period prior to administration, during which food was withheld but water was available. Test material administered via gavage (syringe). Cageside observations of animals were performed 3 times during the first hour after dosing and up to 5 hours post-dosing, after which they were observed twice daily until Day 15. Body weights were measured before testing, day 1 and weekly thereafter. A complete gross necropsy was performed on each rat.

Remark : Comments: Table 2 describes the "volume-dosage" as "10 mg/kg" and should be "10 ml/kg". Tables 1, 3 and 4 correctly report the value as ml/kg.

Result : MEASURED ENDPOINT/INDEX (i.e. LC50, symptoms): Lethality after 14 days.

RESULTS/OBSERVATIONS: No mortality occurred at the single dose of 5000 mg/kg. Rats exhibited normal body weight gain. No toxic symptoms or signs were reported. There were no adverse internal or external effects observed in any rat at necropsy.

Test substance : TEST MATERIAL: Slightly viscous; light yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized scientific procedure for analyzing the acute oral toxicity of a test material in experimental animals conforming to an OECD Limit Dose study. The study fully supports scientific standards and provides sufficient information to support the conclusion that the acute oral LD50 in male/female albino rats is greater than 5000 mg/kg.

24.11.2003 (19)

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

Type	:	LD50
Value	:	> 2 ml/kg bw
Species	:	rabbit
Strain	:	New Zealand white
Sex	:	male/female
Number of animals	:	10
Vehicle	:	
Doses	:	2 ml/kg body weight
Method	:	OECD Guide-line 402 "Acute dermal Toxicity"
Year	:	1987
GLP	:	yes
Test substance	:	

Method : RECOGNIZED METHOD, i.e. OECD: OECD Guideline 402 and EPA Toxic Substances Control Act Test Guidelines (1985)

SPECIES/SEX: Young (3 months) albino outbred New Zealand rabbits; both sexes; weighing 2.4-3.14 kg.

DOSE LEVEL(S) and NUMBER OF DOSES: A single dose of 2 ml of test material per kg body weight was applied to the shaved intact skin site on the back.

NUMBER OF ANIMALS/DOSE: 5 males and 5 females.

STUDY METHOD: 24 hours prior to conducting the study, the dorsum was clipped free of hair, careful not to damage the skin to be used at test sites. A dose of 2.0 ml of test material was applied to the shaved intact skin site on the back. Based upon the specific gravity this is equivalent to a dose of 3.09 g/kg. These skin sites were wrapped with gauze bandages and held in place for 24 hours. After 24 hours the bandages were removed, excess test material was removed with a moistened towel and the test sites were observed for skin reactions. Cageside observations of animals were performed 3 times during the first hour after dosing and up to 5 hours post-dosing, after which they were observed twice daily until Day 15. Body weights were measured before testing, day 1 of testing and weekly thereafter. A complete gross necropsy was performed on each rabbit.

Result : MEASURED ENDPOINT/INDEX (i.e. LD50, PII): The LD50 was greater than 2 ml/kg (equivalent to 3.09 g/Kg).

RESULTS/OBSERVATIONS: There was no mortality at 2 ml/kg. Occasional areas of exfoliation at the treatment site were observed in only 1/10 rabbits; no other external dermal effects were observed. Gross necropsy revealed dark thyroids, thymus, lungs and salivary glands, petechiae of the thymus and/or abnormal gastrointestinal contents in the majority of rabbits examined. The laboratory did not consider these to be adverse effects based upon historical laboratory records for rabbits.

Test substance : TEST MATERIAL: Slightly viscous; light yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized

scientific procedure for analyzing the acute dermal toxicity of a test material in experimental animals. Study details were sufficient to support the conclusions in the report regarding the acute dermal toxicity of the test material.

24.11.2003 (15)

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

Species	:	rabbit
Concentration	:	
Exposure	:	
Exposure time	:	4 hour(s)
Number of animals	:	6
Vehicle	:	
PDII	:	
Result	:	slightly irritating
Classification	:	
Method	:	OECD Guide-line 404 "Acute Dermal Irritation/Corrosion"
Year	:	1987
GLP	:	yes
Test substance	:	

Method : RECOGNIZED METHOD, i.e. OECD: OECD Guideline 404 and EPA Toxic Substances Control Act Test Guidelines (1985)

SPECIES/SEX: Young (3 months) albino outbred New Zealand rabbits; both sexes; weighing 2.08-3.14 kg.

DOSE LEVEL(S) and NUMBER OF DOSES: 0.5 ml of test material was impregnated onto a gauze pad and then applied to the shaved intact skin site on the back.

NUMBER OF ANIMALS/DOSE: 3 males and 3 females.

STUDY METHOD: 24 hours prior to conducting the study, the dorsum was clipped free of hair, careful not to damage the skin to be used as test sites. 0.5 ml of test material was impregnated onto a gauze pad and then applied to the shaved intact skin site on the back. These skin sites were wrapped with gauze bandages and held in place for 4 hours. After 4 hours the bandages were removed, excess test material was removed with a moistened towel and the test sites were observed for erythema and edema. Dermal responses were scored at 1, 24, 48 and 72 hours after patch removal.

Result : MEASURED ENDPOINT/INDEX (i.e. LD50, PII):Test material was considered to be a very slight dermal irritant. A primary dermal irritation score was not reported.

RESULTS/OBSERVATIONS: Very slight erythema (score of 1) was observed in 3 rabbits within one hour after patch removal. At 24 hours only 1/3 rabbits had very slight erythema. This rabbit was negative at 48 hours. No edema was observed at any time.

Test substance : TEST MATERIAL: Slightly viscous; light yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized

scientific procedure for analyzing the primary dermal irritation of a test material in experimental animals. Study details were sufficient to support the conclusions in the report regarding the dermal irritation of the test material.

24.11.2003 (14)

5.2.2 EYE IRRITATION

Species	:	rabbit
Concentration	:	
Dose	:	.1 ml
Exposure time	:	24 hour(s)
Comment	:	not rinsed
Number of animals	:	6
Vehicle	:	
Result	:	slightly irritating
Classification	:	
Method	:	OECD Guide-line 405 "Acute Eye Irritation/Corrosion"
Year	:	1987
GLP	:	yes
Test substance	:	

Method : RECOGNIZED METHOD, i.e. OECD: OECD Guideline 405 and EPA Toxic Substances Control Act Test Guidelines (1985)

SPECIES/SEX: Young (3 months) albino outbred New Zealand rabbits; both sexes; weighing 2.74-3.54 kg.

DOSE LEVEL(S) and NUMBER OF DOSES: 0.1 ml of test material was instilled into the everted lower eye lid of one eye of each rabbit.

NUMBER OF ANIMALS/DOSE: 6 rabbits; 3 of each sex.

STUDY METHOD: 24 hours prior to conduct of the test, the eyes of each rabbit were examined and determined to be free of irritation and abnormalities. On the day of testing, 0.1 ml of test material was instilled into the everted lower eye lid of one eye of each rabbit. The eyes were not rinsed. Eyes were examined at 1, 24, 48, and 72 hours after washing. Corneal opacity (when present) is confirmed using fluorescein.

Remark : Note: Para 4.3 Pre-exposure, test report (page 4) erroneously reports the animal weight in "grams" and should be listed as "kilograms".

Result : MEASURED ENDPOINT/INDEX (i.e. LD50, PII): Test material produced very slight injection of the conjunctival blood vessels in 6/6 rabbits at 1 hour. All scores were zero at 24 hours.

RESULTS/OBSERVATIONS: The scores recorded for cornea, iris and conjunctiva were provided for all rabbits at all reading times. The test material produced very slight conjunctival irritation at 1 hour in all 6 rabbits. Redness observed in all rabbits with a score of 1 in 5/6 and 2 in 1/6 rabbits; discharge observed in 4/6 rabbits with a score of 1 in 3/6 and 2 in 1/6. All scores were zero at 24 hours. A primary eye irritation score was not calculated.

Test substance : TEST MATERIAL: Slightly viscous; light yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized scientific procedure for analyzing the primary eye irritation of a test material in experimental animals. Study details were sufficient to support the conclusions in the report regarding the eye irritation of the test material.

24.11.2003 (18)

5.3 SENSITIZATION

Type	:	Buehler Test
Species	:	guinea pig
Number of animals	:	30
Vehicle	:	
Result	:	not sensitizing
Classification	:	
Method	:	OECD Guide-line 406 "Skin Sensitization"
Year	:	1987
GLP	:	yes
Test substance	:	

Method : RECOGNIZED METHOD, i.e. OECD: OECD Guideline 406 and EPA Toxic Substances Control Act Test Guidelines (1985)

SPECIES/SEX: Dunkin-Hartley albino guinea pigs; weighing 315-484 gm; both sexes.

DOSE LEVEL(S) and NUMBER OF DOSES: 0.25 ml of undiluted test material. Animals were caged 2 per sex per cage.

NUMBER OF ANIMALS/DOSE: 20 test (10 male/10 female) and 10 control g. pigs (5 male/5 female).

STUDY METHOD: Tested in accordance with the Buehler Patch Test (1965), one of several sensitization methods acceptable to OECD. 20 animals were allocated to test groups and 10 to a vehicle control group. Prior to the induction phase, material was tested to determine the concentrations to use, and the highest non-irritating concentration. On the day before applications, the hair from the backs of the g. pigs was removed by clipping, allowing a space for 4 concentrations on each animal.

Induction phase: On the day following clipping, test material was applied to patches and then taped to the upper left quadrant once a week for three weeks (Day 1, 8 and 15). After an exposure period of 6 hours, the patches were removed. On the day following application each site was scored for irritation.

Challenge phase: Two weeks after the last exposure (Day 28) all test and control animals were challenged in the same manner with patches on the right upper flank. The challenge dose was 0.25 ml of undiluted test material held in contact for 6 hours. 24 hours after application of test material the test sites were depilated with cream of calcium thioglycolate and scored to give a 24 hour and 48 hour reading.

Result : MEASURED ENDPOINT/INDEX (i.e.Sensitization):Test material did not produce delayed contact hypersensitivity in guinea pigs.

RESULTS/OBSERVATIONS: There were no dermal responses to occluded application of 10%, 30%, 50% or undiluted test material in paraffin oil. Thus, the undiluted test material was chosen for the induction phase. There was no positive skin sensitization reaction suggestive of hypersensitivity for the test material. The positive control, 0.1% dinitrochlorobenzene in ethanol, produced a grade 1 erythema in 8/9 surviving controls (1 positive control was killed in extremis and replaced).

Test substance : TEST MATERIAL: Slightly viscous; light yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Reliability : (1) valid without restriction
DATA QUALITY: Study followed the protocol of Buehler, an acceptable test method for dermal sensitization, and supports the conclusion that the test material did not product contact hypersensitivity in guinea pigs.

24.11.2003 (21)

5.4 REPEATED DOSE TOXICITY

Type	:	Sub-acute
Species	:	rat
Sex	:	male/female
Strain	:	Sprague-Dawley
Route of admin.	:	oral feed
Exposure period	:	4 weeks
Frequency of treatm.	:	daily
Post exposure period	:	
Doses	:	0, 200, 2000 and 20,000 ppm
Control group	:	yes
NOAEL	:	= 2000 ppm
LOAEL	:	= 20000 ppm
Method	:	OECD Guide-line 407 "Repeated Dose Oral Toxicity - Rodent: 28-day or 14-d Study"
Year	:	1988
GLP	:	yes
Test substance	:	

Method : RECOGNIZED METHOD, i.e. OECD: OECD Guideline 407 and EPA Toxic Substances Control Act Test Guidelines (1985)

SPECIES/SEX: Male/female Sprague-Dawley CD Rats

AGE at Start of Test: 5-6 weeks

ROUTE: Dietary

DOSE LEVEL(S) and NUMBER OF DOSES: 0, 200, 2000 and 20,000 ppm were incorporated into the diet and administered to rats every day for 28 days. Analysis of dietary concentrations demonstrated dose level equivalents of 0, 22, 223.4, and 2331 mg/kg. A positive control group (Di-2-ethyl hexyl phthalate) was also used and incorporated into positive control diets at 15,000 ppm.

NUMBER OF ANIMALS/DOSE: 10M/10F per dose, housed 5/cage; positive control had 5/sex.

BODY WEIGHT MEASUREMENTS: Measured prior to first dose, then weekly throughout study, and at termination.

CAGESIDE OBSERVATIONS: These were performed twice daily.

FOOD CONSUMPTION/FOOD EFFICIENCY: Diet consumption measured by weighing the feeder in each cage.

HEMATOLOGY: Blood samples were collected from the retro-orbital sinus in each rat after 26 days of treatment following overnight fasting. The following were analyzed: Packed cell volume (PCV), hemoglobin (Hb), erythrocyte count (rbc), reticulocyte count, total leukocyte count (wbc), differential leukocyte count (neutrophils, lymphocytes, eosinophils, basophils, monocytes), platelet count, mean cell hemoglobin (MCH), mean cell volume (MCV), mean cell hemoglobin concentration (MCHC), and

prothrombin time (PT).

CLINICAL CHEMISTRY: Blood samples used for clinical chemistry evaluations were collected at the same time and same manner as the hematological samples. The following were determined: alkaline phosphatase (AP), alanine amino transferase (ALT), aspartate amino transferase (AST), urea, creatinine, glucose, total protein, electrophoretic protein fractions, sodium, potassium, chloride, calcium and inorganic phosphorus.

URINALYSIS: Urine samples were collected from all rats in control and high dose groups after 23 days of treatment. Samples collected overnight during food and water restriction. The following were determined: appearance, volume, pH, specific gravity, protein, total reducing substances, glucose, ketones, bilirubin, urobilin, nitrite, blood. A microscopic analysis of the sediment was also performed.

STATISTICAL METHODS: The significance of differences between dosed and control group means were assessed using Student's t-test, Fisher's Exact Probability Test and Dunnett's Test.

ORGAN WEIGHTS: Absolute and relative (organ-body) organ weights were determined for adrenals, brain, heart, kidneys, liver, lungs, pituitary, spleen, thymus, thyroid, uterus and gonads (testes and ovaries).

GROSS PATHOLOGY: A full compliment of tissues were fixed and examined grossly in all animals; including a full compliment of reproductive organs in both sexes.

HISTOPATHOLOGY: A full compliment of tissues were fixed and examined microscopically in 5M/5F animals in the control and high dose groups; including a full compliment of reproductive organs in both sexes. Any macroscopically abnormal tissues from all dose groups were also examined microscopically. Electron microscopy was performed in livers of all rats to assess peroxisome proliferation.

Result : CLINICAL OBSERVATIONS: No evidence of systemic toxicity. Survival was unaffected by dose.

FINDINGS/MEASURED ENDPOINT/INDEX (i.e. LOAEL, NOAEL): Slight body weight decrease observed in high dose females (91% of control) and a decrease in alanine amino transferase activity ($p<0.05$). Also observed in high dose females were decreased calcium and phosphorus levels. There were no other adverse effects observed for hematology, clinical chemistry, urinalysis, organ weights, gross or microscopic analyses. Electron microscopy of livers was negative for peroxisome proliferation. The positive control, DEHP, produced marked signs of toxicity in stark contrast to negative control and test material groups. The LOAEL for the test material was 20,000 ppm, and the NOAEL was 2,000 ppm.

Test substance : TEST MATERIAL: Pale yellow liquid; RC9927; FR-45B; CAS No. 26040-51-7; Code No. 6458-68-1; Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized scientific procedure for determining the adverse effects of a test substance when administered repeatedly in the diet for 4 weeks in experimental animals. Study was conducted in compliance with GLP regulations. The study meets national and international scientific standards and provides sufficient information to support the conclusions regarding the NOAEL and the LOAEL demonstrated from the study data.

13.10.2003 (17)

5.5 GENETIC TOXICITY 'IN VITRO'

Type	:	Ames test
System of testing	:	Salmonella typhimurium
Test concentration	:	50, 158, 500, 1580 and 5000 ug/plate administered in DMSO (0.l ml)
Cycotoxic concentr.	:	
Metabolic activation	:	with and without
Result	:	negative
Method	:	OECD Guide-line 471
Year	:	1987
GLP	:	yes
Test substance	:	

Method :

RECOGNIZED METHOD, i.e. OECD: Procedure followed Ames et al. (1975), OECD test guideline 471 (1983), and EPA Toxic Substances Control Act (1985).

TEST ORGANISM USED: Salmonella typhimurium strains: TA98, TA100, TA1535, TA1537 and TA1538; provided by Dr. B.N. Ames, Berkeley, CA, USA.

TEST COMPOUND CONCENTRATIONS USED: 5 concentrations were evaluated with appropriate vehicle and positive controls. Doses used: 50, 158, 500, 1580 and 5000 ug/plate administered in DMSO (0.l ml).

CONTROL MATERIALS: The following control materials were employed.

Positive Control:
Non-activation:
9-Aminoacridine (50 ug/plate): TA1537
2-Aminoanthracene (5 ug/plate): TA1535
sodium azide (2 ug/plate): TA1535 and TA100
benzo[a]pyrene (5 ug/plate): TA98, TA100, TA1537 and TA1538
2-nitrofluorene (5 ug/plate); TA98, TA1538

Metabolic Activation:
benzo[a]pyrene (5 ug/plate): TA98, TA100, TA1537 and TA1538
2-Aminoanthracene (5 ug/plate): TA1535

Negative control:
DMSO

ACTIVATION: S-9 fraction derived from Aroclor 1254 induced liver of male rats; composition fully described (per ml): 0.4 mM MgCl2.6H20/1.6M KCl, G-6-P (0.1 mM); NADP (0.1 mM); potassium phosphate-sodium phosphate pH 7.4 (0.1 M) and S-9 (10%). S-9 prepared fresh just prior to use.

TEST PERFORMANCE: Standard plate assay for gene mutations in bacterial cells.

PROTOCOL:
Preliminary toxicity tests were performed to assess the dose levels for use in the mutagenicity assays. The test material was prepared in DMSO and transferred to a molten histidine-deficient top-agar, maintained at 45 degrees C. Duplicate samples were prepared. Three serial 10-fold dilutions in top-agar were prepared from each preparation, providing 8 different concentrations of test material ranging from 2.5 ug to 5 mg per plate. Tubes were inoculated with TA98 and incubated at 37 degrees C for 2 days. They were then examined for the presence of background lawn of non-revertant colonies. The highest level of test material chosen is the lowest level causing visible thinning in the background lawn. Since no

concentration produced this effect a 5 mg/plate was selected as the top dose.

Mutagenicity assay was carried out according to Ames et al. (1975). Each dose level of the compound was tested with and without the S9 mix with each strain of S. typhimurium (TA98, TA100, TA1535, TA1537 and TA1538). Cells from a culture of each indicator strain were added to test tubes containing 2 ml of molten histidine-deficient agar supplemented with S9 mix, where appropriate, and maintained at 45 degrees C. The ingredients were thoroughly mixed and immediately poured onto the minimal glucose agar plates. Aliquots of a 10 X E-6 dilution of culture were spread over the surface of the plates. After the top agar had set, the plates were incubated at 37 degrees C for 2 days. Plates were scored for number of revertants/plate. All determinations were made in triplicate, including controls. Each test, in each strain, was conducted on two separate occasions.

Result : REPORT RESULTS: Test compound did not induce a significant increase in the number of revertant colonies over that shown in the solvent control plates for any of the Salmonella typhimurium strains with and without S9 activation, at doses up to and including 5000 ug/plate. Positive controls produced the expected response in all experiments.

CONCLUSION: Test material was not mutagenic in S. typhimurium TA 98, TA100, TA1535, TA1537 or TA1538 with and without S9 activation.

Test substance : TEST MATERIAL: Slightly turbid, viscous pale yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized published scientific procedure for examining the mutagenic potential of a test compound in S. typhimurium bacteria strains. Test method utilized recognized positive controls that gave the expected positive responses, confirming the sensitivity of the method. Dose levels administered were adequate for evaluating the mutagenic potential.

24.11.2003 (16)

Type : Chromosomal aberration test
System of testing : human lymphocytes
Test concentration : 40, 200, and 1000 ug/ml
Cycotoxic concentr. :
Metabolic activation : with and without
Result :
Method : OECD Guide-line 473
Year : 1987
GLP : yes
Test substance :

Method : RECOGNIZED METHOD, i.e. OECD: OECD 473; EPA Toxic Substances Control Act (1985).

TEST CULTURE: Peripheral blood samples from an adult male human were collected, added to complete culture media and phytohemagglutinin to stimulate lymphocyte division. The collected samples were incubated at 37 degrees C for 48 hours. Samples were then centrifuged, the supernatant removed and the cell pellet resuspended in treatment medium. Some medium contained S-9 mix (freshly prepared and derived from livers of male CD rats treated with Aroclor 1254). Vehicle control (DMSO), positive control and test solution vials were incubated at 37 degrees C for 2 hours. Cultures were centrifuged and cells washed with treatment medium. Cells were resuspended in complete culture medium and test solution, vehicle or positive control solutions were added to each vial. Each vial was then incubated at 37 degrees C for 22 hours. Three hours before

terminating the incubation period, colcemid was added to each vial to arrest cell division. At the conclusion of the incubation period vials were centrifuged, cells harvested and resuspended in hypotonic potassium chloride for 10 minutes. Once again they were centrifuged and fixed in methanol:glacial acetic acid.

TEST COMPOUND CONCENTRATIONS USED: A preliminary cytotoxicity test was performed at dose concentrations of 1.6, 8, 40, 200 and 1000 ug/ml. Based upon these results the dose concentrations for the cytogenetic assay were selected. They were 40, 200, and 1000 ug/ml.

CONTROL MATERIAL: DMSO was used as a negative control and was used as the vehicle for the test material. Chlorambucil without S-9 (1 ug/ml) and cyclophosphamide with and without S-9 (6 ug/ml) were used as positive controls.

TEST PERFORMANCE:

Preliminary toxicity test: Single drops of the prepared cell suspensions were added to clean glass slides and air-dried. Slides were made from each culture, stained with Giemsa, washed in buffer and air-dried. Approximately 1000 lymphocytes/culture were examined and the mitotic index calculated. The dose that produced a decrease in mitotic activity was selected as the highest dose concentration. Since the highest dose tested failed to decrease mitotic activity it was selected as the highest concentration for the cytogenetic assay.

Main Cytogenetic Assay: Slides prepared as above and 1000 cells were scored and the mitotic index calculated. The following morphological observations were included: gaps, breaks, fragments, exchanges, multiple aberrations, endoreduplication, pulverized metaphases, and polyploidy. Frequencies of each aberrant metaphase were measured for each culture.

Result : REPORT RESULTS: There was no difference between activated and non-activated mitotic indices and therefore, when considered together there were 13.2, 12.2, 12.7 and 12.7 for 0, 40, 200 and 1000 ug/ml, respectively. Thus, there was no evidence of toxicity to dividing lymphocytes.
There was also no difference in the frequency of chromosomal aberrations between activated and non-activated systems. Since there was no difference the results from replicate treatments were compared from pooled samples of activated and non-activated systems. The positive control, cyclophosphamide, showed a significant increase in aberrations in S-9 solutions compared to non-S-9 solutions.

Chromosomal aberrations were scored from 100 metaphases. Comparison of vehicle control to dose concentrations demonstrated a weak clastogenic effect at 1000 ug/ml.

CONCLUSION: The test material was weakly clastogenic at 1000 ug/ml in cultured human lymphocytes.

Test substance : TEST MATERIAL: Slightly viscous, pale yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Attached document : MU-3 Table.doc

Reliability : (1) valid without restriction
DATA QUALITY: Study was conducted in accordance with a recognized procedure for determining the in vitro chromosomal aberrations in cultured human lymphocytes. The assay followed GLP regulations. The study meets national and international scientific standards for in vitro assay for examining the occurrence of chromosomal aberrations in cultured cells.

24.11.2003 (22)

5.6 GENETIC TOXICITY 'IN VIVO'

Type	:	Micronucleus assay
Species	:	mouse
Sex	:	male/female
Strain	:	CD-1
Route of admin.	:	other: i.p. and dermal
Exposure period	:	
Doses	:	
Result	:	negative
Method	:	OECD Guide-line 474 "Genetic Toxicology: Micronucleus Test"
Year	:	1987
GLP	:	yes
Test substance	:	

Method :

RECOGNIZED METHOD, i.e. OECD: OECD 474; EPA Toxic Substances Control Act (1985). The assay followed the procedure of Schmid, The Micronucleus Test, Mut. Res. 31, pg 9-15 (1975).

TEST ANIMAL: CD-1 male and female mice (4-5 weeks old). Animals were housed in single-sex groups of one, two or five.

TEST COMPOUND CONCENTRATIONS USED: Test material was administered to animals via intraperitoneal and dermal routes. A preliminary toxicity test was performed using the intraperitoneal route in doses of 250, 500, 1000 and 2000 mg/kg. The volume of the dosage was 10 ml/kg. All animals were killed 72 hours after treatment. The intraperitoneal route used dose levels of 80, 400 and 2000 mg/kg. The dermal route used 2000 mg/kg administered on 5 separate occasions, 24 hours apart.

CONTROL MATERIALS: Corn oil was used as a negative control. Chlorambucil (30mg/kg), administered orally, was used as a positive control.

TEST PERFORMANCE:

Preliminary toxicity test (intraperitoneal route): Mice were administered the dose test material in a single dose of 250, 500, 1000 or 2000 mg/kg and then sacrificed after 72 hours. Animals were killed via cervical dislocation following carbon dioxide inhalation. Femurs were removed, dissected and bone marrow samples were collected. These samples were centrifuged, the pellet collected, then resuspended, air-dried and fixed in methanol. These slides were stained using the May-Grumwald and Giemsa technique. At least 2000 erythrocytes per animal were examined. They were scored as to polychromatic or mature. At least 1000 cells of each type were scored from each animal, where possible. Based upon these results the doses were selected for the main dermal and intraperitoneal assays. Since there was no evidence of inhibition of cell division the highest dose, 2000 mg/kg, was selected as the highest dose in the main studies.

Main Study: Intraperitoneal route: Details of slide preparation: 24, 48, and 72 hrs after dose administration 5M/5/F per test article-treated and vehicle control groups are sacrificed by CO2 asphyxiation. Positive control group sacrificed 24 hrs after dosing. Immediately after sacrifice, femurs are exposed and bone marrow aspirated into a syringe containing fetal bovine serum and transferred to a centrifuge tube where the bone marrow cells are pelleted and the supernatant drawn off. Cells resuspended by aspiration with a capillary pipette and a small drop of the bone marrow suspension is spread onto a clean glass slide, air dried, fixed by dipping in methanol, and stained with May-Gruenwald-Giemsa. In addition to

erythrocytes being scored, the presence of micronucleated cells per 1000 erythrocytes were also identified. The proportion of polychromatic erythrocytes to total erythrocytes was also determined as an indication of inhibition of cell division. The frequency of micronuclei in polychromatic cells provides an indication of genetic damage.

Main Study: Dermal Route: Male and female mice were administered 2000 mg/kg dermally on 5 separate occasions with 24 hour intervals between dosing. It was mixed with corn oil and applied to the shaven dorsal skin. Animals were killed at 18 and 48 hours after the final treatment.

Remark : NOTE: The report does not clarify whether the test material was occluded or simply applied to the unwrapped skin.

Result : REPORT RESULTS: There was no increase in the number of micronucleated erythrocytes in bone marrow of treated mice, whether administered via the intraperitoneal or dermal routes.

CONCLUSION: The test material was negative (not clastogenic) in the micronucleus test using male and female CD-1 mice.

Test substance : TEST MATERIAL: Light yellow liquid; FR-45B, RC9927, CAS No. 26040-51-7, Code No. 6159-199-3, Sp. gravity 1.545 @ 25 degrees C/4 degrees C; purity >95%.

Attached document : MU-2 Table.doc

Reliability : (1) valid without restriction

DATA QUALITY: Study was conducted in accordance with a recognized procedure for determining the frequency of micronucleated erythrocytes using bone marrow samples from mice that had been exposed to repeated dermal exposures or single intraperitoneal injections of the test substance. The assay followed GLP regulations.

The study meets national and international scientific standards for in vivo assay for examining the occurrence of chromosomal aberrations in treated animals.

24.11.2003 (20)

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

5.11 ADDITIONAL REMARKS

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

(1) (Group SAR Method)

(2) Aqueous Base/Acid-Catalyzed Hydrolysis (25 deg C) [HYDROWIN v1.67]

(3) Atmospheric Oxidation (25 deg C) [AOPWIN v1.90]

(4) BCF Estimate from LogKow [BCFWIN v2.14]

(5) BIOWIN v4.00

(6) ECOSAR v0.99

(7) ECOSARv0.99

(8) HYDROWIN v1.67

(9) KOWWIN v1.66 estimate

(10) logKow (estimated)

(11) MITI Model

(12) MPBPWIN v.1.40

(13) MPBPWIN v1.40

(14) Pennwalt Corporation. Acute Dermal Irritation/Corrosion Test in the Rabbit. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 86/PTC015/682. January 21, 1987.

(15) Pennwalt Corporation. Acute Percutaneous Toxicity in the Rabbit. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 86/PTC014/676. January 21, 1987.

(16) Pennwalt Corporation. Assessment of Mutagenic Potential in Histidine Auxotrophs of Salmonella Typhimurium (The Ames Test). TESTING FACILITY: Life Science Research, Ltd. STUDY #: 86/PTC018/601. January 8, 1987.

(17) Pennwalt Corporation. Toxicity Study By Dietary Administration to CD Rats for Four Weeks. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 87/PSV003/926. April 7, 1988.

(18) Pennwalt Corporation. Acute Eye Irritation/Corrosion in the Rabbit. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 86/PTC016/686. January 21, 1987.

(19) Pennwalt Corporation. Acute Oral Toxicity Test in the Rat. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 86/PTC013/634. March 11, 1987. AUTHOR(s): Joseph F. Jadlocki and Joel A. Seckar, Ph.D.

(20) Pennwalt Corporation. Assessment of Clastogenic Action on Bone Marrow Erythrocytes in the Micronucleus Test. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 87/PSV001/300. July 28, 1987.

(21) Pennwalt Corporation. Delayed Contact Hypersensitivity Study in Guinea-Pigs. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 87/PTC012/056. March 6, 1987.

(22) Pennwalt Corporation. In Vitro Assessment of the Clastogenic Activity of RC9927 in Cultured Human Lymphocytes. TESTING FACILITY: Life Science Research, Ltd. STUDY #: 87/PTC017/004. March 18, 1987.

(23) Pennwalt Corporation. Pyronil 45: Acute Toxicity to Daphnia magna. TESTING FACILITY: Life Science Research, Ltd.
STUDY #: 89/PSV031/0195. July 10, 1989.

(24) Pennwalt Corporation. Pyronil 45: Acute Toxicity to Rainbow Trout. TESTING FACILITY: Life Science Research, Ltd.
STUDY#: 89/PSV030/0194. June 30, 1989.

(25) Pennwalt Corporation. Pyronil 45: Assessment of its Ready Biodegradability. Modified Sturm Test. TESTING FACILITY: Life Science Research, Ltd. STUDY#: 89/PSV032/0244. July 10, 1989.

(26) Soil Adsorption Coefficient [PCKOCWIN v1.66]

(27) WSKOW v1.40; estimated from LogKow

10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

10.3 RISK ASSESSMENT